Increased sediment and nutrient loading in the water column can enter coastal waters from point source discharges, nonpoint stormwater runoff, or resuspension of bottom sediments. Specific sources that contribute to increased sediment loading include run off from construction activities, unpaved roads, road construction, golf courses, uncontrolled urban surface, mining, silviculture, row crop agriculture, and livestock operations (DWQ 2000). Urbanization can increase the flow and velocity of stormwater runoff, which in turn leads to increased stream bank erosion. Stream bank erosion is a significant source of sediment loading (DWQ 2000). Specific sources that contribute to increased nutrient loading include agricultural and urban runoff, wastewater treatment plants, forestry activities, and atmospheric deposition. Nutrients in point source discharges are primarily from human waste and industrial processes. The primary contributors of nutrients from non-point sources are fertilizer and animal wastes (DWQ 2000).

In North Carolina, there is no official standard for light attenuation or light availability. There are Environmental Management Commission (EMC) standards for other light associated parameters including turbidity, total suspended solids (TSS), and chlorophyll *a*. Research is currently being conducted at NMFS in Beaufort to determine specific light requirements for SAV in North Carolina's estuaries and the relationship between light attenuation and other water quality parameters (P. Biber, NMFS, personal communication 2004). Preliminary results indicate that, given certain combinations of turbidity and nutrients, North Carolina's current standards may not be adequate to sustain SAV (P. Biber, NMFS, personal communication 2004). Modifications may be needed to regulationsand monitoring programs to improve their effectiveness for SAV protection. A review of current chlorophyll, TSS, and turbidity standards should be conducted to determine if they are appropriate for the protection of SAV in North Carolina waters. The DENR should work with NMFS to determine what levels of TSS, chlorophyll a and other parameters are needed to achieve desired water clarity. The feasibility of a water quality standard for light attenuation should be investigated to provide a pro-active target or standard for protection and restoration of SAV.

In addition to effects from water quality degradation, SAV can be removed or damaged by water-based activities. Dredging for navigational channels, marinas, or infrastructure such as bridges, submarine pipelines, or cables can result in large, direct losses of SAV. Beach nourishment projects that involve mining of sand from inlets or relocating of inlet channels can result in significant loss of SAV due to both immediate dredging through grass, or scouring of newly positioned channels through once shallow grassbeds. Scouring of large areas of SAV beds in western Bogue Sound occurred following the relocation of Bogue Inlet channel in 2004, for beach nourishment of Emerald Isle (W. Cuthrell, pers. com, 2006). Results from aerial photography of Bogue Sound, taken in 2006 by NOAA will aid in determining the extent of impact of that project on SAV. Docks constructed over SAV can cause immediate loss during construction or gradual loss due to shading effects. Several studies in Florida have shown that SAV was significantly reduced or eliminated under and around docks that were less than 5.5 ft above mean high water or where light received was less than 14% of the available surface light (Loflin 1995; Shafer 1999). In addition to direct damage from